



**Eni Lamix 30**  
high performance drilling base fluid



**eni**

[oilproducts.eni.com](http://oilproducts.eni.com)



## Introduction Eni Lamix 30

pag. 4

- Description pag. 4
- Typical values pag. 5
- Excellent rheological performance pag. 6
- Mud rheology and stability pag. 7



## Properties

pag. 8

- Lubricating properties pag. 8
- Odourless, wear, no irritant pag. 8
- FDA compliant pag. 8
- Low volatility pag. 8
- Good elastomer compatibility pag. 10
- Non-flammable fluid pag. 11
- OGP classification pag. 11



## Environment friendly fluid

pag. 12

## Eni Lamix 30

Eni Refining & Marketing manufactures and sells **Eni Lamix 30**, a drilling base fluid continuously improved in synergy with the internal experience of **Eni Exploration & Production**.

Eni Refining & Marketing commitment is to transfer driller requirements to its R&D department to develop a drilling fluid with:

- High drilling performance, even in extreme conditions (HP/HT, low temperatures, extended reach and horizontal wells)
- Great care for the environment
- Minimum fire hazard

### Description

**Eni Lamix 30** is a highly refined fluid especially developed for drilling oil based mud (OBM). It is a complex mixture of hydrocracked and desulfurized hydro carbons with a narrow distillation cut (205-245°C).



### Typical values

LAMIX 30	UNIT	PROPERTIES	METHODS	UNIT	LAMIX 30
6.71	ib/gal	Density at 20°C/68°F	ASTM D 1298	kg/m <sup>3</sup>	790
30	-	Colour	ATSM D 156	-	30
408-471	°F	Boiling range	ATSM D 86	°C	205-245
186.8	°F	Flash point pm	ATSM D 93	°C	86
>428	°F	Autoignition temperature	DIN 51794	°C	>220
-43.6	°F	Pour point	ATSM D 97	°C	-42
<b>VISCOSITY:</b>					
6.7	cSt	at -20°C/-4°F	ATSM D 445	cSt	6.7
3.7	cSt	at 0°C/32°F	ATSM D 445	cSt	3.7
2.4	cSt	at 20°C/68°F	ATSM D 445	cSt	2.4
1.6	cSt	at 40°C/104°F	ATSM D 445	cSt	1.6
172.4	°F	Aniline point	ATSM D 611	°C	78
Insolubile	mg/l	Solubility in water	-	mg/l	insolubile
<b>VAPOUR PRESSURE:</b>					
0.031	mbars	at 20°C/68°F	calculated	mbars	0,031
0.155	mbars	at 40°C/104°F		mbars	0,155
2.072	mbars	at 80°C/176°F		mbars	2,072
400	ppm	Aromatic content	NF M07-073	ppm	400
0	ppm	Total pah content	GC/MS	ppm	0
0	ppm	BTEX content*	GC/MS	ppm	0
<3	ppm	Sulphur content	ASTM D 5453	ppm	<3

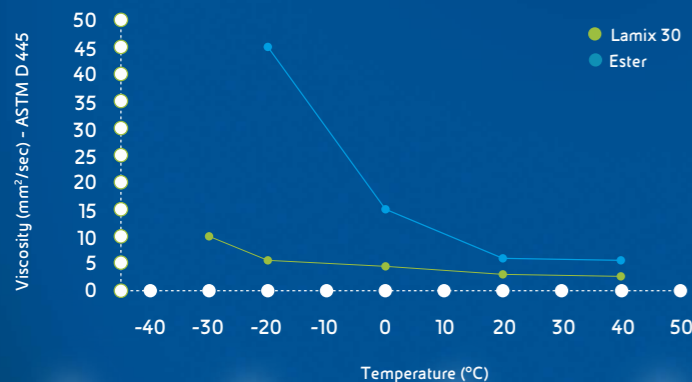
## Excellent rheological performance

Eni Lamix 30 has very good rheological properties at low temperatures. Its flat "kinematics viscosity-temperature" profile favours:

- Low viscosity at low temperatures: minimises oil retention on cuttings and allows operation in low temperature environments and Deep Water

- Low viscosity:
  - Provides minimum torque and drag that allows extended reach and horizontal wells
  - Allows better removal of solid cuttings from mud
- Low torque: easier restart after a long stop
- Lower circulation pressure: helps to prevent formation damage
- Low pressure resuming circulation

VISCOSITY (ASTM) VS. TEMPERATURE



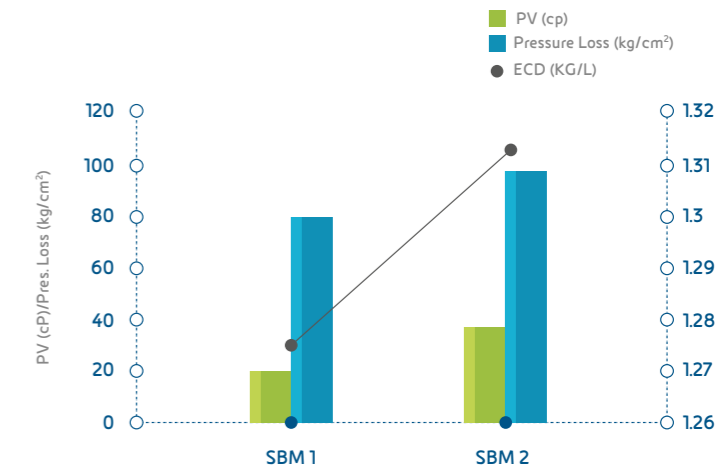
## Mud rheology and stability

Eni Lamix 30 helps to reduce the overall mud viscosity, with improved performance and reduced ECD.

These allow in critical condition (delta pressure very low) to reduce pressure drop and to continue drilling.

It provides less stress on the formation, less stress to equipment and minor stress to the drilling operations.

SUPERIOR MUD PERFORMANCE OF LAMIX 30 (SBM 1) VS. OTHER COMMERCIAL BASE FLUID (SBM 2)



Muds properties: O/W 70/30, s.g. = 1.25, rheology measured at 39°C.  
ECD and Pres. Loss simulated for 8 1/2" hole at 3,286 m. flow rate 1800 L/min.

## Properties

### Lubricating Properties

Eni Lamix 30 can considerably reduce the friction factor between the drill string and the sides of the borehole.

### Odourless, clear, no irritant

Eni Lamix 30 is a clear odourless and no irritant product having a very low aromatic and sulphur content. It is not classified as irritant to eyes and skin according to the European Legislation criteria.

### FDA compliant

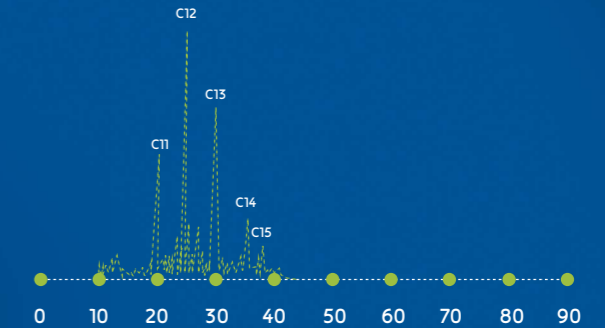
It also meets the requirements of **F.D.A. (Food and Drug Administration) 21 CFR 178.3910** for indirect contact with food.

### Low volatility

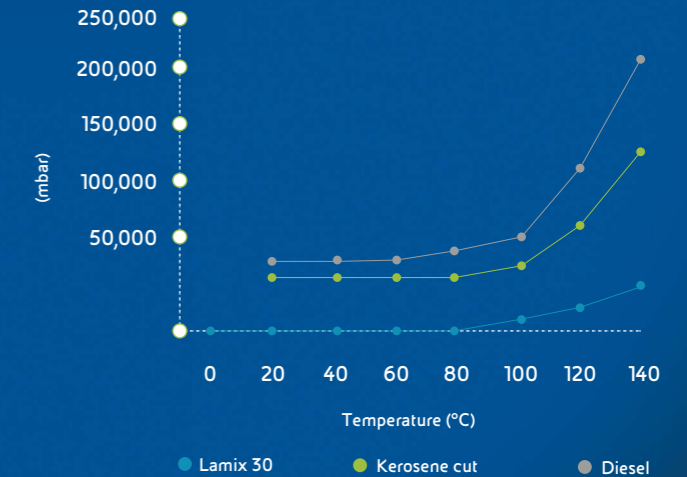
Eni Lamix 30 is a safe product for its low vapor pressure due to the narrow distillation cut and the particular hydrocarbon distribution (C11-C14). This property ensures low odor formation and low fume emissions.



LAMIX 30 - GC ANALYSIS - PARAFFIN DISTRIBUTION



LAMIX 30 - GC ANALYSIS - PARAFFIN DISTRIBUTION



## Good Elastomer Compatibility

Eni Lamix 30 has given good results when tested with selected elastomers in order to assure the perfect compatibility with rubber equipments.

ENI LAMIX 30: ELASTOMER COMPATIBILITY -  
Immersion Compatibility Test: 132°C - 168°C

MATERIAL	PACKING ELEMENT REACTIVITY INDEX	SEAL REACTIVITY INDEX
Nitrile	R1	R2
Hydrogenated Nitrile	R1	R2
Viton 1	R1	R2
Viton 2	R1	R2
Viton 3	R1	R2

R1: Minor Change, no Restriction

R2: Moderate Change, Minor Effect on Performance



## Non-flammable fluid

Eni Lamix 30 shows high Flash Point compared with other drilling base fluids with equivalent viscosity.

- Is not classified as flammable according to Italian Regulation (D.M. of 04.28.1997 update). Substances and the liquid preparations having low flash point are classified as flammable according to the European regulations [Directive 67/548/EEC amended nine times (9<sup>o</sup> Amendment: 2006/121/EC) and adapted to technical progress twenty-nine times (29th ATP: 2004/73/EC)]. The classification is demanded to each Member State.
- Is assigned to CLASS III according to the classification of Petroleum Products and Flammable Liquids defined by the Energy Institute (formerly Institute of Petroleum UK) based on the value of closed cup flash point.
- It is classified as combustible liquid of CLASS IIIA, according to the NFPA 30 Flammable and Combustible Liquids Code.
- Is not classified as Dangerous Goods for carriage according to the present ADR, IMDG and IATA regulations.

## OGP Classification

Eni Lamix 30 meets the requirements of Class III (low to negligible aromatic content) according to OGP Classification (Report n.°342 May 2003: environmental aspects of the use and disposal of non-aqueous drilling fluids associated with off-shore oil&gas operation).

Eni Lamix 30 respects the aquatic environment showing a high marine biodegradability and a very low ecotoxicity. Moreover, for on-shore applications, Eni Lamix 30 has high biodegradability in fresh water.

## Environmental friendly fluid

Eni Lamix 30 respects the aquatic environment showing a high marine biodegradability and a very low ecotoxicity. Moreover, for on-shore applications, Eni Lamix 30 has high biodegradability in fresh water.

ECOTOXICITY	METHODS	UNIT	ENI LAMIX 30
BIODEGRADABILITY (MARINE WATER)	OECD 306	%	82%
BIODEGRADABILITY (FRESH WATER)	OECD 306	%	75%
COROPHIUM VOLUTATOR (LC50 / 10 DAYS)		mg/l	>1,518
ACARTIA TONSA (48h LC50)		mg/l	>9,960
ALGAE SKELETONEMA (72h EC50)		mg/l	>10,000
FISH TEST SCOPHTALMUS MAXIMUS (96h LC50)		mg/l	>3,217
TILAPIA MOSSAMBICA		mg/l	22,366
MUGIL PERSIA		mg/l	16,552
BOLEOPTHALMUS BODDARTI		mg/l	69,035

Eni Lamix 30 is a non-hazardous product for the aquatic environment, meets requirements of OSPAR Commission and it is classified by Norway Legislation as a **Full Yellow** Product.

Eni Lamix 30 is classified as **Almost non-toxic** according to

Australian Petroleum Exploration Association having a very low ecotoxicity testing to Tilapia mossambica, Mugil Persia, Boleophthalmus Boddari (Report from Indian National Environmental Engineering Research Institute - NEERI).



Acartia Tonsa



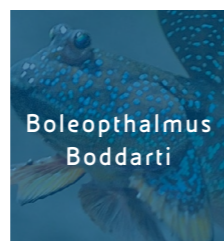
Scophtalmus Maximus



Skeletonema Costatum



Corophium Volutator



Boleophthalmus Boddarti



Tilapia Mossambica



Mugil Persia

## OUTSTANDING CHARACTERISTICS

- Low viscosity
- Flat rheology
- Narrow distillation cut
- Very low aromatic content
- Very low sulphur content
- High aniline point
- Low pour point
- High flash point

## PERFORMANCE

- Low Equivalent Circulating Density
- Less Pressure Losses
- High mud electrical stability
- Better Removal on solid cuttings
- Lower Oil retention on cuttings



## ENVIRONMENTAL FRIENDLY

- Non-toxic product for aquatic environment
- High Biodegradability both in fresh and marine water

## SAFETY

- Odourless and clear
- Meets FDA 21 CFR 178.3910
- Low volatility
- Good rubber compatibility
- Not flammable
- Transport safety

## APPLICATIONS

- HP - HT drilling
- Extended reach and horizontal wells
- Deep Water
- Cold Areas

## Eni Lamix main activities

**Eni Lamix 30** has been successfully used in several Exploration & Production Projects in Africa, Asia and Europe. The outstanding performances of Lamix 30 allowed to achieve extraordinary results in extremely demanding conditions. A few examples:



### ANGOLA WEST HUB PROJECT

Project Highlights: drilling of 24 deep-water wells (14 production and 10 injection) between 1000 and 1.500 meters of water.



### MOZAMBICO CORAL PROJECT

Project Highlights: drilling of deep-water wells at ocean depths ranging from 1.500 and 2.300 meters and reaching a total depth of over 5.000 m.



### ANGOLA EAST HUB PROJECT

Project Highlights: drilling of 9 off-shore wells (5 production and 4 injection) in 450/550 meters of water and reaching a 2.700 meters depth from ocean surface.



### KAZAKHSTAN KASHAGAN PROJECT

Project Highlights: off-shore shallow-water Kashagan operations drilled wells in waters up to 200 meters deep, but reaching 4,5/5 km below water. Extremely low temperatures and ice formations contributed to project complexity.



**Eni** is a major integrated energy company committed to growth in the activities of finding, producing, transporting, transforming and marketing oil and gas. **Eni** is an integrated company that operates across the entire energy chain, employing more than 33,000 people in 69 Countries around the world. Our way of doing business, based on operating excellence, focus on health, safety and the environment, is committed to preventing and mitigating operational risks. **Eni Refining & Marketing** has always been

committed to researching and producing ultra-high performance lubricants and operates in the industrial market in Italy, Europe and various other Countries. The **Eni** lubricant lines for industry are able to meet all the lubrication needs of industrial plants of any type with a quality level to the top of the market. **Eni Refining & Marketing** maintains and reinforces its technical and commercial leadership status in the fields of technology, quality, environmental protection and technical support for its customers.

## Research centre

The **Eni** Research Centre in San Donato Milanese has state-of-the-art laboratories featuring advanced equipment for studying, developing and fully identifying the characteristics of raw materials for high performance lubricants. In line with the company's marketing strategies, the **Eni** research involves performing important technical activities in collaboration with important machinery manufacturers, regulatory authorities and

several prestigious Italian universities. The **Eni** Research Centre complies with the UNI EN ISO 9001 standard in relation to the activities of "Applied research, technical support and laboratory analyses in the energy sector: lubricants, additives, bitumens, special products for motor vehicles and for industrial use" and "Production on pilot systems of lubricants, propellants and fuels" (sector EA 34,35 - certificate no. 676).



## Our commitment to ensure customer satisfaction

The **Eni Refining & Marketing** organization is able to support customers for any need regarding lubrication oils and to consolidate a confidential relationship based on integrated technical support services.

### Sales assistance

The **Eni** sales network, present on the territory, provides information on the range of lubricating oils and assists customers in all the product procurement phases.

### Technical assistance

**Eni** technicians are available to help solving any operative issue

and can provide their assistance to arrange lubrication guides, to follow the oil charge monitoring and to offer training courses regarding lubrication.

### Laboratory assistance

The **Eni** laboratories give their full assistance to customers for the oil charge control by periodic monitoring in order to guarantee the best operating efficiency of lubricated machineries.

For more information [oilproducts.eni.com](http://oilproducts.eni.com)



**Eni SpA**  
**Refining & Marketing**

Via Laurentina, 449  
00142 Rome, Italy  
Phone 0039 06 59881